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ABSTRACT

This study is about the impact on students and their families when students used computers in a "summer camp" setting and when computers were introduced into the homes of students who normally could not afford to buy them. The computer camp project involved minority group students 8 to 10 years of age, in 2-hour sessions, 5 days a week for 6 weeks. Parents of students given microcomputers for home use also participated in a computer-training program. Naturalistic research techniques formed the core of the data collection, and findings of the naturalistic evaluation are discussed in terms of the following themes: base-line descriptions of child and parent characteristics, parent and student expectations, and final participants' impressions of the PAL/Consortium Computer Center Summer Computer Camp Equity Project. Supported by the private sector, community and national organizations, and the school system, the program proved effective in most ways. However, dividing the students into those with or without computers in the home was counterproductive. First, students without home computers had a larger drop-out rate and poorer attendance than students with computers at home. Second the "pure" two-group evaluation paradigm was not necessary. (RH)

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Technical Report Number 2

AN EVALUATION OF THE PAL/CONSORTIUM COMPUTER CENTER SUMMER COMPUTER CAMP EQUITY PROJECT

Margot Ely, Ph.D.
Professor of Education

November 1984

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Executive Summary

This study is about the impact of microcomputers on children and their families when students used computers in a "summer camp" setting, and when computers were also introduced into the students' households, ones that would not normally have had the economic resources to purchase them. The setting can be described as an urban, low-income area comprised mostly of minority members.

The computer camp project was planned to involve two groups of students in two-hour morning or afternoon sessions, five days a week for six weeks, July 9 through August 17, 1984. From the pool of 46 students, a selected group of 24 would receive computers at home. The parents of these students would undertake a computer-training program as well. Overall, the project aimed to make a beginning towards computer equity for these students. Students were from 7 to 14 years old. Most of them were aged 8, 9, and 10.

The aim of evaluation was to produce qualitative descriptions about the impact of the project on the people who were involved. Naturalistic research techniques formed the core of data collection. These techniques included observation at school and at home, multiple interviews of parents, students, and teachers, and the collection of pertinent documents. Instruments were built while the program was in process, and the major portion of data analysis depended on establishing themes from the data, rather than from imposing pre-determined structures upon them.

Naturalistic study is an in-depth process that seeks many layers of information about an event. Because of this, naturalistic research usually studies a smaller population than, for example, survey and experimental research, which can tap more people for information

about fewer facets. To this investigator's knowledge, the present study is unique in its naturalistic focus on the impact of microcomputers on children and their families in a low-income community.

A variety of research questions addressed students' growth in skills and attitudes as well as the effects of introducing microcomputers into the homes.

The results include themes that allude to dramatic changes at home and in the community.

Parent-caretakers described

*their children as developing a high level, self-powered style of learning as well as improved attitudes towards learning

*intense and widespread interest and involvement of families and neighborhoods

*a different use of time at home

*an expansion and enrichment of children's language

Student themes described

*growth in feelings of accomplishment and esteem

*increased awareness of themselves as students and as people with responsibility towards others.

Findings were compared to those of a study of the microcomputer experience of middle and upper middle income families (Giacquinta, Ely, Smith-Burke, 1984). In comparison, the subjects of the present study seemed less worried that their children would "get hooked on computers" and more wholeheartedly hopeful about the promise of computers. The ripple effect to family and neighborhood seemed stronger, and there was some evidence that children used time differently at home.

Students who received computers at home had an appreciably

better attendance rate (77%) than those who did not receive computers (47%), and they alluded to more specific career goals as well. Teacher ratings of students' growth on 12 descriptors of computer skill and literacy indicated significant gains ($p<.0001$) for all students who attended.

Parent-caretakers communicated great support of their children and active involvement in their academic lives. Both parent-caretakers and students voiced tremendous faith that computers would have positive effect on students' academic accomplishments and future professional lives. Some ramifications for educators of these "computer dreams" were discussed.

Consideration was given to several issues about program design, evaluation design, and the effects of innovations in order to provide perspective on this evaluation as well as to strengthen future projects and their evaluations.

Among the 16 recommendations are the following:

***that the program be continued for the 1984 group and expanded to others**

***that every student receive a computer at home**

***that a Community Outreach Group be established and spearheaded by the 1984 summer program parent-caretakers**

***that the curriculum be extended to include programs such as word-processing and Logo, which may be additional routes for students to develop higher-level thinking processes**

***that there be a concomitant training strand by which the adults in charge focus on ways of interacting with students that can enhance learning**

This vanguard project brought together the support of the private sector, community and national organizations, and the school system to the benefit of children and their families in a low-income

community. It holds tremendous promise and equally as much need for professional perspective. Continuing research is recommended, both as a follow-up of the 1984 group and as a resource for new computer projects. Such study may well have important local, state, and national implications.

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OVERVIEW OF THE PROJECT

This evaluation is about the impact of microcomputers on children and their families when students used computers in a "summer camp" school setting, and when computers also were introduced into the students' households, ones that would not normally have the economic resources to purchase them. The setting can be described as an urban, low-income area comprised mostly of minority members.

The computer camp project was planned to involve two groups of students in two-hour morning or afternoon sessions, five days a week for six weeks, July 9 through August 17, 1984. From the pool of students, a selected group would receive computers at home. The parents of these students would undertake a computer-training component as well. Overall, the project aimed to make a beginning towards computer equity for these students.

Its title alone, The PAL/Consortium Computer Center Summer Computer Camp Equity Project, indicates that this project was supported in a variety of ways. Indeed, the title does not do justice to the many interwoven strands that eventually made possible a computer camp experience for students. Some of these included a gift by a private citizen, Leonard J. Fassler, who underwrote the cost of personal computers for summer use at home, the dual sponsorship and cooperative work of the Police Athletic League and Community School District 9 of The Bronx, involvement of community leaders, and grants to support the evaluation by the New York City Board of Education and New York University's School of Education, Health, Nursing, and Arts Professions.

If ever a project had broad-based support, this was the one. At the helm of coordinating the program, and in no small way the catalysts for action, were the co-directors of the Consortium Computer Center. This center serves six Bronx school districts and four cities in southern Westchester.

The Research Paradigm

The evaluation was guided by a point of view that people are complex beings that deserve to be described in as many pertinent ways as possible, particularly when they are involved in a process that seeks to affect their lives. Guba and Lincoln's (1981) paradigm of responsive evaluation powered data-collection and defined how the evaluation team worked.

At its inception, the evaluation had two research questions:

1. Does the target population, with access to home use of computers, demonstrate higher performance skills in logic, problem-solving, programming, and computer literacy awareness than do participants whose only access to computers is during the day at camp?

2. Does the target population, with access to home use of computers, have improved attitudinal concepts relating to self-esteem, improved self-concept, and ability to define career goals and objectives as compared to participants whose only access to computers is during the day at camp?

Some project realities that will be discussed in the next section made it less possible to be as "neat" as seemed to be required by these two research questions. Moreover, it became increasingly clear to the evaluators that the impact of the project on both groups of students called for an expanded strategy: there could be comparison between the cognitive and affective growth of members of the two groups, as called for by the research questions; there could be description of the growth of all students; and, where it made sense, there could be description of the growth of members of one group alone. An example of this last strategy stems from a series of findings that describes how parents talked about what happened at home after the computers arrived. In this case, obviously, there could be no comparison between the two groups because the findings relate only to the experience of the group with computers at home.

Yet the data make a powerful case, and they do so solely with an "internal comparison" of the reported changes in the lives of the people in one group.

Naturalistic research techniques formed the core of data-collection. Naturalistic, or ethnographic, study seeks qualitative descriptions in an effort to understand and describe the meanings people ascribe to events and persons. In striving to come closer to understanding people's meanings, the researchers' stance is that those they study become the teachers and instruct the investigator in what they find meaningful (Spradley and McCurdy, 1972, pp. 11-12). In essence, the investigator attempts to reach for the informant's point of view, to "see out of" the informant's eyes.

Since the present evaluation spanned only a short time, one cannot consider it a full-scale naturalistic study. It did, however, use a series of techniques of such study: observation at school and at home, multiple interviews of parents, students, and teachers, and the collection of pertinent documents. Instruments were built in process, and the major portion of data-analysis depended on establishing themes from the data, rather than from imposing pre-determined structures upon them.

The nature of the research allowed other questions to arise and be answered during the process. These were:

What were some effects of introducing computers into the homes?

a. How were the computers used?
b. How were other people involved?
c. How did children talk about the computers?
d. How did children use time at home?
e. How did parent—caretakers describe what was happening to their children, their children's friends, their families?
How did the parent—caretakers describe what was happen-

ing to their children, their children's friends, their families?

How did the children evaluate the experience?

Specifically, the evaluation team took these steps:

1. Demographic information about each participant and her or his household was collected and amalgamated.

2. Observations of classroom activities were made for a minimum of 50 hours over 16 days. Most observations were made by at least two research team members during the same visit. These observations resulted in ongoing field notes that became the basis for later interviews and observation directions.

3. Students were interviewed toward the beginning and again toward the end of the computer camp. This resulted in a total of 36 beginning and 25 ending interviews of students. Interview questions were based upon insights from observations as well as the objectives of the evaluation, and the interviews were audiotaped.

4. Parent-caretakers were interviewed at school towards the beginning of the program. This resulted in 15 interviews and accounted for 20 students. Thirteen parent-caretakers were again interviewed at home, toward the end of the program. Interviews were audiotaped.

5. The training of parent-caretakers in computer-use was observed for two sessions.

6. A rating instrument on computer performance, problem-solving, and literacy was created with the help of the teacher after classroom observations had begun. The teacher completed this instrument for students in the second week of the program and at the end.

7. The teacher was interviewed twice, and the teaching assistants were interviewed once. These interviews were audiotaped.

8. Pertinent documents were collected.

9. Field noted and audiotaped interviews were analyzed to establish themes and describe unique events. Theme-establishment was influenced primarily by the work of Bussis, Chittenden, Amarel, and Carini (1978). I this analysis, the researchers employ the data themselves to create a category system. This is a complex process in which data are studied, combined, and recombined in cycles. The aim is to tease out patterns and to use these to create themes that integrate the data (Carini, 1975). In this light, a theme may be likened to one in music. For the analysis, a theme was defined in two ways:

(a) a statement of meaning that ran through all or most of the data under analysis for a particular question, and

(b) a statement of meaning provided by one person or by a small group that carried enough emotional or factual weight to be judged important to the issue under examination.

Other data, such as an analysis of documents and of rating form results, helped to describe the process and to add layers to the findings.

Reliability was established during both data-collection and data-analysis. Classroom observations were considered reliable when two observers reached 90% or greater agreement on notes about a 15-minute observation period. Such reliability of observation was established five times over five weeks.

The analysis of data was considered reliable when two or more analysts reached 95% or greater agreement on the analysis of a ten-minute segment of audiotaped interview. Reliability of data-analysis was established three times over a period of four weeks.

Validity checks of contextual appropriateness of analysis re-

sults were carried out with six students and three parents. In this, each person was told of the results of an analysis of one of her or his interviews and asked if these made sense and if and how they needed to be changed. Those so contacted judged all results acceptable. Guba (1978) wrote, "Who is in a better position to judge whether the categories appropriately reflect their issues and concerns than the people themselves?" (p. 5).

Description of the Project

Computer activities took place in one room approximately 25 by 14 feet. Generally the room housed 13 working and 2 non-working computers.

The adult group in the room varied. There were differing combinations of one teacher, two teacher-assistants, up to four Police Athletic League (hereafter referred to as PAL) counselors, and up to three evaluators.

There was one morning and one afternoon session. The morning session swelled to a total of 27 at one point. This group comprised mainly students who attended PAL and who arrived in the PAL van, and several children who came with parents or by themselves. The afternoon session totaled 19 at its highest point. These students came from PAL and other community groups. All students were registered in the PAL program.

Overall, morning session students had higher attendance records and spent more hours in the classroom. This session ran for a total of 26 days. The average attendance per A.M. student was 16.9 days, or 64%.

The afternoon session ran for 23 days. The average attendance per P.M. student was 13.4 days, or 58%.

Students were from 7 to 14 years in age, with most of them at ages 8, 9, and 10. In the fall of 1984 they would enter grades 2 to 10.

The curriculum consisted mainly of learning to program and of practicing programming skills. The teacher, in an interview, said that the students learned the concepts of:

1. PRINT statement
2. LET statement
3. TAB
4. FOR...NEXT
5. INPUT statement

as well as how to load and save programs on disks, to access programs, and to write their own programs. Toward the final two weeks of the program most of what was planned had been introduced and many students became involved in playing commercial computer games. Recommendation 7 will consider curriculum.

The emphasis on programming was deliberate, reported the teacher, who was also co-director of the Consortium Computer Center. She felt that programming, or "telling the computer what to do," would help these students develop routes to employment as well as expand their computer-literacy and feelings of personal worth and power.

By the second day, each computer was used by two students. Students were overheard telling their partners what to do to get their computers running. There was an air of cooperation and mutual learning. Perhaps the most dramatic sign of interest was that not once, on the first day, did any student ask to go to the bathroom!

Their positive acceptance of partnership on computers changed slowly so that, by their final interviews, students talked of their

desire to work by themselves. After two weeks, partners seemed more distant from the task when they were not having their turns.

There will be fuller descriptions of the students in the next section. Briefly, one may characterize them as intelligent, humorous, serious, dedicated, and honest. They related well to the adults around them. Most knew how to ask for help. The adults were often available to help and to support in other ways.

Students learned to save their programs on disks from the first week. They shared disks, so that several students' work occupied the same disk.

The teacher was in charge of the flow of presentation and of coordinating the teaching-assistants' work. The teacher introduced new lessons to the whole group and then allowed them to practice. Students stayed at common activities arising from these lessons throughout the weeks. The students broke this pattern four times during the observations. In each instance, a student had learned something new about the computer at home, was putting it into practice, and was teaching it to other students, who were eager to learn. This phenomenon was particularly telling one day when a student introduced screen-flashing. A room full of flashing screens is an experience not to be missed.

The students who instigated new skills came equally from those who received computers at home and from those who did not. Indeed, an unexpected finding was that most students had had some limited experience with computers. Much of that occurred in schools where computer use was restricted because of the large number of students. However, some summer students had used computers at school or had

been told about computers there, while looking at them. Another group of students had used computers at home, mostly for gaming. Three students had home access to microcomputers that members of their families owned. Several other students, while without direct home access, had siblings who were studying about computers in high school or college and who talked with them about what they were learning.

The teacher assigned some homework at the beginning of the program. This took the form of instruction sheets for study. However, the teacher did not continue this practice because she felt that the sheets had little impact on the children.

A group comprising representatives from the Police Athletic League Webster Avenue Center and from Community School District 9 selected the students who would receive computers at home. Criteria for selection were four: (a) that parents were willing to accept the responsibility of a computer at home, (b) that one parent would be able to attend each of three training sessions of two hours' length, (c) that the homes were judged relatively secure, and (d) that the students had little or no prior experience with computers.

As with most translations to reality, some changes in emphasis occurred. Parents' stated interest and willingness seemed to be the most important factors in selecting students. Because of parents' strong community ties and involvement, many of them were known to the selection committee, and, thus, information about their homes' security was also known. Students' prior experience with computers seemed to be the criterion of least weight. Given the fact that many students had had some computer experience, this made sense.

On July 20, the end of the second week, the first nine computers

were delivered to homes. These were for 12 students. An additional 10 computers were delivered during the week of July 23. By Friday, July 27, then, 19 computers serving 24 students were in students' homes. These computers were returned on August 10. Thus, 12 students had access to computers at home for 21 days, and 12 students had home access from 14 to 18 days.

There were no formal programs as such for what occurred with the computers at home. That was left up to the students and their families.

There were two sessions at school for parent-caretakers. These were orientation lectures followed by a brief period on how to hook up computers and get started on the keyboard. Most parent-caretakers who attended were given time off from their jobs and, because of this, attended only one of these mid-day sessions. The parent-caretakers attended en masse, however, a July 25 press presentation about the program held at the New York City Board of Education building, where they were warm and vocal in their support:

> "Everybody in the neighborhood wants to get into it. I told them there is a waiting list."
>
> * * *
>
> "The whole family is using it. My oldest son went through the whole book already."
>
> * * *
>
> "It's making them read and figure out the instructions."
>
> * * *

These statements foreshadowed themes that were to emerge from the final interviews.

The Subjects: Base-Line Data

In an evaluation such as this it is vital that a base-line picture about the students be established in depth, especially since qualitative changes in their lives were sought and described.

What emerges is a dramatic statement about these children and their families that flies in the face of many stereotypes about economically poor people: a picture of students' strengths, intelligence, and their parents' deep insight, care, and active support. Were it not for the fact that the evaluation team later made home visits, it would have been impossible even to attempt to describe these people's economic status from their first interviews. It is true that it was not possible to interview the parent-caretakers of students who would not receive computers at home. Such interviews would have been in order. However, the picture provided by their children was so similar to that of the other students that it seems probable that no great differences existed between the two groups of parent-caretakers other than one group's inability to attend training sessions.

Parent-caretakers of 80% of the students who later received computers at home comprised the beginning interview group. Of these 15 adults, 11 were mothers of students. Four other people were related to students as brother, sister, aunt, and grandmother. The ages of students who received computers at home were representative of those of the entire group.

Interview questions for these people were constructed so that they could give any of a variety of replies:

1. Please describe your child: What is he or she like?
2. Why is your child in computer camp?

3. What do you think will happen?
4. Have you witnessed anything already about your child and computer camp?
5. What other comments do you have right now?

A total of 36 students were interviewed for their beginning impressions during the second week of the program, before the delivery of the computers to the families. Of the total, 22 students would later receive computers at home, and 14 would not.

Interview questions for the students also allowed for open responses:

1. Please describe yourself: What kind of a person are you?
2. Why are you in computer camp?
3. What do you think will happen? What will you get out of computer camp?
4. How are you doing?
5. What do you like about computer camp?
6. What suggestions do you have to make it better?
7. What kind of a student are you? How far do you plan to go in school?
8. What are your plans for the future? (Probe)
9. What other comments do have right now?

Data from interviews are described next for their trends and/or combined into themes. Each theme statement is followed by a series of quotations from the interviews that are selected examples from the data that made up the theme.

What Are These Children Like?

Parent-caretakers were asked to describe their children in order to get capsule impressions from their points of view. The answers were specific, descriptive, and particularly, positive. The people seemed to enjoy their children, seeing them from a vantage point of strength, but also noting their needs.

THEME 1: THIS IS AN ACTIVE CHILD; AN ACTIVE THINKER, LEARNER AND DOER

This theme was present in 12, or 80% of the interviews. The picture emerged of children who act upon the world, who can take

initiative. Further, the adults around them seem to appreciate this characteristic.

"He likes to know everything. He gets bored and wants to go on to something else."

"She has her own agenda. She thinks a lot. She's heavy."

* * *

"She's so active. She reads and teaches the kids to read."

* * *

"If he thinks it will benefit him, he'll pay attention."

* * *

"They are constantly into everything. They love to move, to learn."

* * *

"I'm active civilly and politically. She's been involved with me in this since birth."

THEME 2: THIS IS AN INTELLIGENT CHILD

All but three of the adults specifically described the children as intelligent. The fact that the children's parent-caretakers see them as intellectually capable may be crucial to how the children see themselves and to how they develop.

"She's innovative, bright, inquisitive."

* * *

"She's very smart."

* * *

"He has to say, `I want to learn about this,' and he will!"

* * *

"...a bit intellectual...more to himself type...deep."

* * *

"...bright...shy...sensitive."

* * *

"They just eat up learning. They'll learn anything."

The students did not speak as much in these broad terms as they did in the specifics that support the next theme. However, the overall tone of how students saw their capacities was sturdy and positive.

THEME 3: THIS CHILD DOES WELL IN SCHOOL

This theme, often said with obvious pride, was a strong one for

11 of the 15 adults. Doing well in school seemed to be defined primarily by achievement test scores and grades. In this, the language about school was distinctly different from when parent-caretakers described their children as intelligent, learning people.

"His scores are really good. He loves school. I don't want him to lose it."

* * *

"She tested 9th grade in reading and 8.4 in math."

* * *

"He's a 'whizz kid' in school."

* * *

"He's an A student."

* * *

"...in gifted class."

* * *

"...fine test scores."

Students' interviews combined into a parallel theme:

"I'm doing perfect."

* * *

"I guess I do pretty good: I get A's."

* * *

"I'm always the head of the class."

* * *

"I have a good report card."

This theme of doing well in school held for 82% (18) of students who later received computers at home and 71% (10) of those who did not. Since the numbers are small, the difference is not considered significant.

THEME 4: THIS CHILD DOES NOT DO AS WELL IN SCHOOL AS HE OR SHE CAN

Five adults, 33% of those interviewed, indicated that there were some problem areas at school. But here, also, their support of the children is evident.

"She gets angry at school. She says it's boring."

* * *

"In school they complain that she's quiet."

* * *

"She's a little hardheaded. She needs self-control. Her reading scores weren't so good. We're trying to help her at home."

"She has to go to summer school for reading in the afternoon."

* * *

"He could be an A student. But he's not getting too much input. He seems lost about some school things."

* * *

"He gets bored easy. I wish school were more interesting--for everybody."

Interestingly, also a minority of students who were and who were not to get computers at home echoed this theme, albeit with more of a subject-matter focus.

"I passed all my grades, but my mother said I needed a little more."

* * *

"I have some problems with reading."

* * *

"I'm not so hot in math."

* * *

"I'm high in reading but not in math."

While the next theme does not describe the students directly, it is considered important in understanding how significant adults saw their roles with their children.

THEME 5: I'M ACTIVE ON BEHALF OF MY CHILD

This theme is all the more important because the question, "Please describe your child" does not specifically lead to it. The theme was voiced by eight interviewees.

"I see the potential, and I push him. I want to keep him interested. He loves school. I don't want him to lose it. I keep him active."

* * *

"On the first day of junior high school I sat in his class. I need to know what's going on. He was embarrassed, but I needed to do it. I'm very serious about education."

* * *

"I want to know how to help her. She grasps, but you have to stay after her. Once she understands, it's like a light. I tell the teacher about that."

* * *

"(As their grandmother,) I'm interested in having them get into as many educational things as possible. That's why their parents had them stay with me this summer."

* * *

"My mother had six kids. I was the first one who pulled herself up in my family, and now I'm trying to pull my kids up. I'm just dragging myself along, and I'm pulling these kids with me. I'm real active about that."

What Brought the Students to the Program?

The majority, or 9 of the parent-caretakers said that the reason students enrolled in the computer camp was direct involvement of parents with the PAL. Some were employed with the PAL; some had had children registered in previous PAL programs. One parent heard of the PAL program from a local hospital outreach service, and one from a sibling. Three people learned of the program from the president of the community school board. Responses to this question attested to what may happen when organizations other than the school itself are engaged in program support.

Overwhelmingly, the reasons were person-bound ones:

"I talked to (the PAL representative) because I didn't want him only playing in camp."

* * *

"If (a school board member) says you'll bring a computer home, you'll bring a computer home. (He) does not lie."

* * *

"...talked with (the police precinct officer), and he said we should give it a try."

Several interviewees mentioned other reasons:

"...important for her to have exposure...to prepare for the future."

* * *

"...they should be doing something meaningful."

* * *

"He needed an outlet because he has problems with a brother at home. I figured computer camp would be great for him."

* * *

"To help me and a son learn about computers."

The students' replies about what had brought them to the program are similar. Six students who would later be recipients of computers mentioned that their relatives worked with the PAL, and four others

said that the president of the community school board had told them of the program. Of the students who would not receive computers at home, one said that he was helped to learn of the program by the president of the community school board. One student from each group mentioned having received a scholarship from the community school board to attend the PAL.

What Are the People's Expectations for the Summer Program?

Parent-caretakers were asked what they though would be the results of the program. Their replies fell into four themes that may be seen on a continuum from the meeting of immediate specific needs to the meeting of future needs as yet unspecified. These themes are characterized by tremendous faith that computers will affect learning and grades. The parent-caretakers of these students who elsewhere described them in the main as intelligent and good students (pp. 14 15) with only a minority not doing as well as they can (p. 15) seemed bent on the idea that the students should and could do better, and that working with computers would be the route to do this. In this, the emphasis on grades and scores continues.

The first three expectation themes were each discussed by a majority of adult respondents. The fourth is made up of reports from fewer than half of the people interviewed, but was judged important.

THEME 6: MY CHILD WILL LEARN ABOUT THE COMPUTER, DEVELOP COMPUTER SKILLS AND OTHER WAYS TO GET AHEAD IN SCHOOL

"Kids are so amazing. In six weeks she'll probably know the computer upside-down...will be programming."

* * *

"He'll have the knowledge to talk about it. He'll have a lot to say. He'll use computer language."

* * *

"The whole family will learn. I'll have him teach me. This is something he can use. Basketball is one thing, but this is more."

* * *

"...make up games, math problems...not just for games, for learning."

* * *

"She'll learn self-control."

When students were asked what they expected from the summer, they most often responded that they expected to gain knowledge about the computer and computer skills. This was true for those who would and those who would not receive computers at home.

THEME 7: I HOPE THAT MY CHILD WILL BENEFIT DIRECTLY BY DOING BETTER ACADEMICALLY

"I hope it will bring up his math and his reading skills."

* * *

"The computer will help her in math."

* * *

"I hope I can see her reading score go up, and that she'll sharpen her skills."

* * *

"I think this will enable them to go farther in their school work this year. They'll be ahead of the rest of the class because they're having an advantage."

In student interviews the theme of expecting academic benefits was also a strong one:

"I would use what I know very well in math."

* * *

"...help me be better in reading scores."

THEME 8: THIS COMPUTER CAMP WILL BENEFIT MY CHILD'S FUTURE

"He'll get interested so that later in life he could look back, and it will be worthwhile. He could apply it later. He wants to be an architect."

* * *

"They'll be aware. They'll continue with this. This is where everything is going in the future. It's a good opportunity for them to influence what will happen later on."

* * *

"Before there was failure. Nothing for them. Now this will train them to go into the field and succeed."

* * *

"I want him to play, but I want him to see different adventures in front of him when it comes to learning, to what his future will be."

* * *

"I want him to see that there's something else out there for him...that he can make something of himself."

* * *

"There's a feeling of hope children get, `Now I can work at the computer. Perhaps I can get a job in the future. School is worth staying in now--I can stop playing hooky because if I stay and learn about computers I might have a chance.'"

Students, too, voiced expectations for the future. This was true for both groups:

"It could help in my career. I want to get a job in computers."

* * *

"It could help me if I was a secretary."

* * *

"I want to get ahead. Knowing about the computer will help me."

* * *

The faith expressed by these people in the potential for computers to help students in school and with their future professions was echoed also in a study of middle and upper-middle socio-economic status parents and their children. (Giacquinta, E[illegible] Smith-Burke, 1984). However, the people in the present study seemed more vehement about their convictions and more wholeheartedly hopeful.

THEME 9: THE COMPUTER CAMP EXPERIENCE MAY HAVE OTHER, FAR-LASTING EFFECTS BEST KNOWN TO MY CHILD

"Whatever he has in mind is in his hands. He hasn't told me. He's going to work on this computer that has really blown his mind, and he'll know."

* * *

"They always ask things of me, and the only thing I ask from them is to get a good education. It's not for me. Education is for you. Education is most important, and only you can tell what you got out of it."

* * *

Several students in both groups replied that they did not yet yet have an idea about possible results of the program. This sort of thoughtful, open thinking was characteristic of many of them.

Adults and children talked of the impact of the program before computers arrived in the homes. Their statements can be considered initial impressions.

The great majority of parent-caretaker statements were supportive; hence an overarching theme:

THEME 10: THIS BEGINNING HAS HAD POSITIVE IMPACT ON MY CHILD AND OTHERS IN MY FAMILY AND NEIGHBORHOOD

This theme was voiced by all 15 interviewees. It was composed of four specific sub-themes:

SUB-THEME 10a: MY CHILD SHARES AT HOME WHAT HE OR SHE HAS LEARNED

"My child writes the program on the blackboard and says, `You have to PLAN, and it has to be in the correct block.'"

* * *

"He shares what he learns every day. I bought him a pad and said, `Every day when you learn something new, you write it down so I will know what you are learning.'"

* * *

"They come in: `Guess what I did today!' And they'll be talking and showing what they did.'

* * *

"She said, `Mommy, look what I did!' and she showed me this paper. And I knew I had to take time because if your kids see you're interested then they're willing to learn and work. Every night she explains."

* * *

"He brings work home, shows me what it's all about. It's interesting. I want to know more about it so we can apply it both together."

* * *

"`Grandma, you should see how we can use that machine. You should see the pictures and things that we make, and you should see how we program!'"

* * *

SUB-THEME 10b: MY CHILD'S LANGUAGE IS CHANGING AND EXPANDING

"...his use of slang. IN ONE WEEK! It's as if it's fallen out of his vocabulary."

* * *

"...speaking computerese. Her language is enriched."

* * *

"...they talk more. They talk differently."

SUB-THEME 10c: NEWS ABOUT THE PROGRAM IS REACHING OTHER PEOPLE ALREADY

"I've got a line of kids already who say, 'Can I see the computer when it comes?'"

* * *

"His brother and sister want him to teach them."

* * *

"They have impressed their friends about it. They all come to me. I've had several people asking if they could bring their children into the program."

SUB-THEME 10d: MY CHILD HAS CHANGED AS A PERSON

"He's totally different now. He's outgoing. He wasn't interested in things before, but now he's RUSHING to school... It's changed him, his personality."

* * *

"She's really blown my mind. It's really exciting. There's not the attitude of needing to be forced."

* * *

"He seems more mature. He seems like he's getting the baby out of him. He understands the value of things more."

The students, too, provided information about their initial impressions of computer camp. Their theme is somewhat different since it is grounded in the students' immediate personal points of view as compared to the parent-caretaker themes with their broader "outsider" point of view. In the analysis to come, both groups of students, those who would receive computers and those who would not, made similar responses.

For all students the overarching initial impression is:

THEME 11: I'M LEARNING A LOT ABOUT COMPUTERS: I'M DOING WELL AT THE START, AND I FEEL GOOD ABOUT THIS

"I'm learning about programming. I understand a lot."

* * *

"I understand a lot--not everything--but a lot."

* * *

"I'm getting better although I never used it before."

* * *

"I'm learning. It's step by step on the computer."

* * *

"I didn't know what was going on the first day, but now I'm learning."

* * *

"It's exciting and interesting, and I can do it."

* * *

"They're teaching us really a lot and good."

These supporting statements are as yet general, but they carry feelings of optimism and initial accomplishments.

Of the 36 students, 33 supported this theme directly. Of three dissenters, one talked of being bored, one of not wishing to be there, and one of not learning. However, in other parts of their interviews, all three indicated that the experience was worth it. Of these three students one would eventually receive a computer at home and two would not.

Only one student described what was happening in more far-reaching terms:

"This gives us time to think and put that all into our minds."

This student did not later receive a computer at home.

Both parent-caretaker and student themes about the initial period of the program serve as a basis with which to view later themes. The initial impact was strong and positive.

Final Impressions of the Program

Parent—Caretakers

Second interviews were held with 13 parents-caretakers who were related to 17 students, or 71% of the student group that received computers at home. Interviews took place in people's homes or at their places of work after computers had been at home for an average of two weeks. This timing was necessary because the computers were in the homes for three weeks at most.

The interview questions were again open ones whose purpose was

to elicit information rather than to shape results:

1. What has been happening since the computer arrived? What have you noticed?
2. How is the computer used? By whom?
3. How do people interact with the computer?
4. What changes, if any, have you noticed since the computer arrived?

It was observed in the homes that the computers were cared for with caution and sensibility. Some were hooked up and in permanent position, either in living rooms or in bed rooms. Other computers were stored in closets or under beds, ready to be joined into systems when the students came home. Only in one home was a computer held on a lap, instead of a table, and that was only for part of the time. People's genuine care was borne out also in the fact that they returned all 19 computers, most of them on the date due, one week before the end of the program.

Five parent-caretakers discussed some problems either in hooking up the systems or in using the Commodore 64, which was a different make from those used at the computer camp: the investigators communicated these concerns to the teacher, who then worked with the students involved.

The themes that follow are more specific and descriptive than the first interview ones, although some are similar. They provide a finer-grained description of adult impressions at a time well into the program. What they allude to may have important ramifications about both students' cognitive growth and students' affective growth. All of these themes were voiced by the large majority of people interviewed.

THEME 12: MY CHILD IS FIGURING THINGS OUT BY HERSELF OR HIMSELF. IN THIS, MY CHILD CAN MAKE TRANSITIONS TO A DIFFERENT COMPUTER, CAN WORK OUT PROBLEMS, AND CAN WORK COOPERATIVELY

This theme was described in 11 out of the 13 interviews. It attests to the growth of a specific and powerful style of learning:

"He glanced through the book one time, but, after, he just went straight to the computer and started doing what he knew how to do and seeing how this works, and how that works."

* * *

"At first, when it first came, he was confused because the keys here were different from the computer at school, so then he messed around and messed around until he got the hang of it."

* * *

"She involves everybody in it, sometimes to figure things out. My older daughter is home from college, and she is also majoring in data-computing, so she is able to give her little tidbits."

* * *

"She experiments with the language that she knows, trying to put more input into it. She works trying to get new programs or new ideas together to put on the screen."

* * *

"She has a basic computer book at home, and she goes through it. She reads the instructions and pretty much understands what she is reading. Then she goes ahead and does it."

* * *

"They (two students from the same family) figure things out between themselves. They correct each other and figure out how to solve problems together. I watch, and I'm amazed."

THEME 13: THE COMPUTER AT HOME HAS HAD A RIPPLE EFFECT TO OTHER PEOPLE IN THE FAMILY AND THE NEIGHBORHOOD

An extremely strong finding, in 11 out of 13 interviews, describes the geometric progression by which computers at home, abetted by the students in charge, touched the lives of others. This theme may be one of the best indications of the interest, perhaps hunger, of these people in urban poverty to learn about computers.

"There are no problems other than having a house full of my neighbors' inquisitive, curious children every evening for the past three evenings..."

* * *

"She has been teaching the neighborhood children. She is a very popular lady. A special friend touches; the others watch. I suspect before it is all over she may let them touch."

* * *

"Since the computer got there, I know we have a lot of company. All the kids are coming. They are fascinated by it because I have said to the children this is something more important than Atari because it will help you with your homework."

* * *

"I work at PAL. Lots of parents have come from all areas to ask about registering for next year. Lots of kids saw the newspaper clipping from the press conference at the Board of Education, and they said they want to be in it too."

* * *

"Between the four of them, who is going to use what? I have not made a schedule: I am trying to let them work it out for themselves. They don't give me time to use it. They say, `Mommy, watch what I'm doing.'"

* * *

"He has shown his three brothers and sisters how to use it. He has taught me and my husband. I use the computer if he lets me. Otherwise, I leave his computer alone."

* * *

"Can you imagine? she taught my two grandchildren age 2 and 3 some things. They pick up very easily. I really expect them to pick up a lot, because they talk about it so much."

The following quotation is typical of four statements by adults who seemed to take to heart the training emphasis on care, by going to great lengths to "protect" the computer:

"Lots of kids know of the computer; I just don't allow them upstairs. Too many hands in the bush. There is a great deal of interest in it: lots of kids want to come upstairs and have him hook up the computer, and they want to come see him play with the computer, but I don't allow it."

THEME 14: MY CHILD USES TIME AT HOME DIFFERENTLY NOW. THERE IS MORE TIME FOR THE COMPUTER AND LESS FOR TV, GAMES, AND OTHER ACTIVITIES.

Of the 13 people interviewed, 9 described a different use of time after the computer arrived at home. This may be related to the initial flush of interest at having a much desired innovation close at hand, or it may be the start of a longer pattern. Because of its time limit, this evaluation could not make any conclusions about the ongoing effect. However, the changes in uses of time are provocative because they indicate obvious interest and commitment. Some issues that pertain are how people's interest in and commitment to computer

work may be continued and strengthened in ways that are not at the expense of other necessary life activities.

> "I take them out on the weekend, and they say, `I want to get back so I can do some work on the computer.'"
>
> * * *
>
> "Nine times out of 10 I have to say, `Honey, you know, it's time for a breather: let's go outside.' Believe me, he is very interested in doing this. I just got to get him away from it. The computer is not you life: don't build it all around it."
>
> * * *
>
> "They fight over it. So I have to give them times to use it. They spend more time on the computer than they want to do anything else. They really enjoy it."
>
> * * *
>
> "When he comes home he wants to work on it. He gives it more time now than basketball. What a change!"
>
> * * *
>
> "She would work constantly with it if I let her. I have to drive her away from it. It has stopped her from watching some television and cut down some radio time."
>
> * * *
>
> "The girls decided to unhook their Atari set completely because they are bored with it. They'd much rather work on the computer."

These statements indicate that the adults were aware of and had some concern about the amount of time their children spent on computers. However, their statements were characterized by tones of pride, humor, and ease. This was not the case in the study by Giacquinta, Ely and Smith-Burke (1984), where parents of a higher socio-economic status voiced fears that their children would get "hooked on computers" (p. 10).

THEME 15: MY CHILD WORKS DIFFERENTLY. MY CHILD FEELS BETTER ABOUT HER OR HIS WORK.

Nine of 13 people interviewed described their children's changed work habits and feelings about work. These were so intertwined as to be inseparable. This theme is paired with Theme 12: MY CHILD IS FIGURING THINGS OUT BY HIMSELF OR HERSELF. Both speak to improved

attitudes and skills. They will be used as partial support in replying to research questions I and II.

"He is a changed child. I couldn't get him involved in anything. I put him in boy scouts--he's bored; in the church group--he's bored. His attention span wasn't very long unless he was playing basketball. He didn't want to come to computer camp, but I said, `Go.' Now he's fascinated. He sticks by it. He works, and he doesn't mind attacking problems. He's proud of himself. he feels proud of his work."

* * *

"Before, she wouldn't listen to anything her brother had to say because she was younger. But now it is different: she listens and she works together with him."

* * *

"The exposure around more kids and older kids--he's got a little more mature. He likes the responsibility he has with the computer. He's willing to open up and see how it is. Before, he always wanted a quick answer. He seems more confident."

* * *

"She's calmer when she works at the computer--less hyper than usual."

* * *

"They go to the computer. They don't feel it's necessary to ask permission. They don't need to be told to use it like I do with other school work. They just go and work."

* * *

"Today it was raining, and I said, `Are you going to stay home?' He didn't even give it a second's thought: he was up and ready to go. There was no hesitation. He wants to work now. He says he's good at it."

* * *

"Since she has a computer at home now, she feels she can do really well with it. I've never seen her work so hard, with so much pleasure."

* * *

"He's more mature. You know, I would tell him, `No,' and he would scream and be mad and shrug his shoulders. But now if I tell him, `No,' that's it. He's more sure of himself and his work. He is starting to understand more things."

THEME 16: MY CHILD'S LANGUAGE CONTINUES TO CHANGE: MY CHILD USES MORE COMPUTER TERMINOLOGY AND TALKS DIFFERENTLY TO AND ABOUT PEOPLE.

Change in language is considered a potent indicator of people's conceptual changes, of learning. It was therefore significant that parent-caretakers so often mentioned that their children used language differently, and that they did so in their initial impressions as well as here, in their final ones. Eight people described aspects

of this theme, which is considered both more specific and of broader impact than the initial theme (p. 21).

"He stopped using street language. His language has improved. It brings up your vocabulary. When your mind moves up, you've got to move with your mind."

* * *

"They are teaching me the computer terminology. My older daughter was asking if this computer could be put into another computer, and her boyfriend was explaining you need a telephone, and the girls (both computer camp students) joined right in the talk. I was fascinated that they held their own."

* * *

"He speaks different: he uses computer works, like: you have to work in code sequences and plan lines."

* * *

"There is a definite change because her interest is now growing towards computers. She talks about computers so much."

* * *

"His language is better. He can relate to his grandma now, who works at New York Telephone."

* * *

"She explains quite a lot to me because I have just a general knowledge of computers. She talks about things that they have learned. She tells me, `This is what we did. This is what we need to do. We`re learning this because it's important. That's why we go over it.' She's teaching me so much."

* * *

"At the beginning he used to complain about the younger kids. He'd say, `They are so silly and slow.' Now he says, `Mommy, you should see how we all learn. Those young kids are whizzes. I like working with them!"

THEME 17: THE COMPUTER EXPERIENCE SHOULD BE EXTENDED FOR MY CHILD AND FOR OTHER CHILDREN.

This theme is the final one, not because it is the weakest but because it sums up best the stated convictions of every adult interviewed. The view is that this experience was a beginning that needs to be continued in order to reap maximum benefits. Dedication to the broader community was as passionate as was that to individual children.

"Is it going to be continued? I feel it is a great program, and it should be extended more so that they can get much more experience than what they already have, because it keeps

them out of trouble, it keeps their minds on going to computer class instead of keeping their face on the TV. I think that's what they need. It should be extended to others too."

* * *

"I think this whole concept is wonderful. It is giving a large number of kids an opportunity to even become familiar with the computer. And the whole concept of taking it home to practice, to learn, to really enhance what you get during the day: it is marvelous. There couldn't be anything better. It absolutely should be extended to other kids, until you've really reached and touched so many kids that the impact of computers will have made a difference. I hope we go to other districts."

* * *

"I hope it is continued. My kids have just begun. I hope we will get the computers back in September. I must find a way to buy a computer if we don't get one. It is something worthwhile. I hope other kids get the chance too."

* * *

"I know that it will keep a lot of children at home instead of in the streets. There won't be as many problems in the school because, if they are able to get this in the schools, the children will be interested in going to school because there is something new."

* * *

"The program was so short. I hope they extend it, most definitely. Not only for my child, but for others. It kind of settles children down. It's a challenge. They love it. They love it. It can change their lives."

* * *

"Bring this program to more children. It gives them more to look forward to, to expand their minds. Sometimes school is so boring, so much memorizing facts. Once they get the basic of it and realize they can go on and on, that's what makes learning. That's power!"

* * *

"I had no idea this would happen. It's something that's needed. When we catch on to the brains and hold on to the young minds, that's important!"

* * *

"When this program is over, then what? If they take it away, he may lose interest, he may feel upset about it, he may not want to get in another program, feeling it may end soon, and he'll get disappointed. It's true. They don't want to start and stop."

The reports from adults were overwhelmingly positive. However, one case was in the minority. This was an interview that described the student as having lost interest and being "too busy playing to really try to work on the computer." This student's schedule was such that one half day was spent in computer camp, and one half day in summer school, working on reading. It seemed reasonable to the eval-

uators that such a heavy academic schedule, particularly in the summertime, was quite one-sided. And, so, the impact of the computer at home was minor in the eyes of the adult who was interviewed.

Students' Final Impressions

Because the issue of attendance is germane to this section, some data about this seem in order first. The attendance of students who received computers at home was higher in both sessions than was that of those who did not receive computers. In the morning, the home computer group had 85% attendance; the no home computer group had 43%. In the afternoon, the home computer group had 63% attendance; the no home computer group had 52%.

The question is whether these two groups of students would have had different attendance in any case, without computers at home. That is, were they different to start with? This evaluation cannot determine such base-line data. However, it is reasonable to say that there were impressive attendance differences, and that computers at home may have had much to do with them.

Second interviews were held with students during the next-to-last week of the program. Once again, the interview questions were posed in broad terms so that the students could contribute as much of their thinking as possible:

1. What did you like about the computer camp?
2. What changes would you make for a future program?
3. What did you learn about yourself?
4. What are your plans for future schooling and job?
5. Do you have any other comments?

In all, 25 students were interviewed. Of these, 18 were in the group that had received computers at home (n=24); 16 of the 18 had both a first and second interview. Seven students of the group that

had not received computers at home (n=18) were interviewed. Of these, only three had both a first and a second interview. This fact introduces a major difference between the groups: by the end of the program, more students who did not receive computers at home had spotty attendance, if they attended at all. Some of this may have been related. Certainly it was in one case. Several weeks before, one student announced to the evaluators that it was unfair not to have received a computer at home, and that the student would no longer attend. Indeed, this became true.

In the analyses to follow, one cannot dismiss the fact that the group who did not receive computers at home is very small. There is little chance that the replies of 7 students can form strong patterns, and much more chance that the replies of 18 can do so. Thus, while the responses of both groups often had similar shape, those of the group that received computers at home can be viewed with greater confidence than can those of the other group, and comparison between the groups becomes chancy at best.

Perhaps the strongest indication of what happened to these two groups, which seemed similar along a variety of descriptors at the beginning of the program is that, in the five days given to final interviewing during the last two weeks of the program, 75% of those who received computers at home attended, and all of these were interviewed; of those who did not receive computers at home, 39% attended, and all of these were interviewed.

The themes that follow are informative in themselves. They take on increasing weight, however, because their data very often support

what was said by parent-caretakers. This checking and triangulation provides some measure of confidence that what the groups reported was true for them.

THEME 18: THIS PROGRAM WAS WORTH IT. I LEARNED A LOT, AND I LIKED THE EXPERIENCE.

"I like programming and solving math problems. I like the way the computer listens, even if I make a mistake. It tells me where the error is."

* * *

"I liked making the designs after I planned them out on paper, and saving them."

* * *

"I though working the keys was neat."

* * *

"I liked playing with the computer and working things out. When I mess up I can write HOME and do it over."

* * *

"I liked some of the people. They were nice. They didn't yell at me when I had a problem."

* * *

"I liked that we could do it for ourselves. I thought that they were going to be doing it for us. But we got to do it."

* * *

"I liked getting a computer in my home. I used it every day. I made up programs and tried them out here too."

* * *

"I liked working with classmates. I liked working with my cousin at home and watching other kids."

* * *

"I liked the games."

THEME 19: I HAVE SUGGESTIONS TO MAKE THE COMPUTER CAMP EVEN BETTER.

Suggestions for change fall into five sub-themes. In each case, the sub-theme was supported by both groups of students. Particularly touching was the sub-theme suggesting that all students be lent computers at home, because it was made by students who did not receive those computers as well as by those who did.

SUB-THEME 19a: WE NEED MORE COMPUTERS, ENOUGH SO THAT EACH STUDENT HAS A COMPUTER AT SCHOOL.

"I wanted more computers in the classroom so that everybody could have their own computer and not wait around so much."

* * *

"Let every child have a computer because not many children have a computer or get to use one. Some kids want to use the computer a lot more, and they probably really need the knowledge."

* * *

"Get more computers. At the beginning, it's all right, but soon, when kids have to share, they get mad."

SUB-THEME 19b: EVERYONE SHOULD GET A COMPUTER AT HOME.

"I'd like a computer at home. I'd teach my sister. I'd teach each person how to use it."

* * *

"Let everybody have a computer at home. The children could be helped to learn if they had a computer at home. I learned a lot that way."

* * *

"I'd take one home. When will I get one?"

SUB-THEME 19c: THE ADULTS CAN SERVE US EVEN BETTER

"Get more people, about five, to help the kids. I need advice when I get stuck."

* * *

"Don't let nobody get mean when the kids be bad."

* * *

"I would like the teachers to get more involved with each person rather than just teaching the lesson."

* * *

"The teacher should let me help someone who doesn't know how to use the computer."

* * *

"I like it, but I don't like everything: I don't like people losing patience. Patience is a virtue."

SUB-THEME 19d: SOME PHYSICAL AND MATERIAL CHANGES WOULD HELP

"Let me have my own desk."

* * *

"We need a bigger room. We need to sit better."

* * *

"We need more Commodores at school."

* * *

"I'd like to choose my seat, to sit next to who I wanted."

SUB-THEME 19e: SOME CHANGE OF PROGRAM WOULD HELP

"I want to come for a full day."

* * *

"We need more work."

* * *

"I'd like a group of people in each age group."

* * *

"Some don't get to go to computer camp because they don't have enough money. They should come."

THEME 20: I LEARNED A LOT ABOUT MYSELF. I LEARNED THAT I CAN DO IT, AND THAT OTHERS CAN DO IT. I FEEL GOOD ABOUT MYSELF.

This theme was strong. It was supported by all students interviewed. By far the most emphatic pattern of replies for both groups was about growth in self-esteem, self-concept, and self-knowledge. This theme will be used as support for research question II.

"I learned that I can do better than I thought I would."

* * *

"I learned that just saying you don't know doesn't help. You know if you try."

* * *

"I learned that I'm smart."

* * *

"...I can think."

* * *

"I like doing my stuff now on my own, without people telling me how. Now I figure it out. I just sit down and concentrate for a minute, and I get the answer in my head."

* * *

"In the beginning you feel you can't do it. Then you learn how to do it. Then you believe in yourself."

* * *

"I learned a lot. Learning a lot can change your actions. I feel good about myself."

* * *

"I learned that when I make mistakes I don't like to do things over. I have to work on that."

* * *

"I enjoy it. I'm interested. I knew I was interested before, but not as much."

* * *

"I learned other kids can do it. Everybody learned."

Change in Career Goals

The interviewers asked students questions about school and career goals in both first and second interviews and compared each student's answers over time.

The results should be seen in light of the facts that (a) students had had at least one week of computer camp experience before the first interview, and (b) the second interview was held about three weeks after the first. The comparisons are further complicated

because 15 students who received computers at home contributed answers to this question in both interviews, while only 3 students who did not receive computers at home did so. Results are summarized in Table 1.

Table 1
Future Plans - First to Second Interview

Direction of Change	Students: Computer at Home	Students: No Computer at Home
1. Less Specific to Professional Specific		
"school" to nursing	1	
"can't tell" to computer teaching	1	
"don't know" to computer expert	1	
"don't know" to teaching	1	
"don't know" to nursing	1	
"go further" to college, teach	1	
"high school" to architect, computer work	1	
"maybe college" to college, nursing		1
2. No Change		
college - professions	5[a]	2
"don't know"	1	
3. Lower to Higher Level of Education		
"high school" to business institute	1	
4. Specific to More General		
"high school and college" to not decided	1	
TOTAL	15	3

[a] Note. In their second interviews, 4 of these 5 students added that they also planned to work with computers.

From the first to the second interviews, students who received computers at home defined their school and career goals more specifically and higher on the professional ladder in 8 cases (53% of 15) and remained constant about initially high career goals in 5 more cases (33%), with some added words for their intended computer use.

Certainly this might make a substantial case. However, the strength of these goals cannot be ascertained until follow-up study

is done. While the interviewers consciously tried to accept any response and to be neutral in asking questions, students have been known to wish to please adults by "saying the right thing." Further, students were involved in a computer camp experience that was the talk of their neighborhoods. Some of the excitement and feelings of importance may also have colored replies. Last, the reality is that children of these ages often change their minds. With these provisos, however, the fact is that these students' statements alluded to improved educational and career goals.

A large number of students provided data in only one interview. Thus, it is not possible to see how their responses might have changed. However, it seems useful to describe what they said since the large majority of them made verbal commitment to study and/or careers.

Six students who received computers at home took part in only one interview. Of these, three talked of going to college, and one of using computers in "financial business." The two remaining students were not sure of their plans.

Fourteen students who did not receive computers at home took part in only one interview. Of these, eight said they planned to go to college, one said he wants to "go to the top," one said she would love to be a secretary and switchboard operator, three described plans to finish high school and get jobs, and one student was a bit more general in that he wanted to "go to school and learn."

Discussion and Answers to Research Questions

This evaluation describes a program that had positive effects in most ways. That conclusion will hold as the specific research questions are answered. Within this understanding, however, several issues bear closer examination since they may help provide perspective on this evaluation as well as strengthen future projects and their evaluations. These issues are about program design, evaluation design, and the Hawthorne Effect of innovations.

At its onset, the computer equity camp project, and so its evaluation, was predicated upon establishing and describing two groups of students: those who would receive computers at home and those who would not. This paradigm was counterproductive in two major ways.

First, a program that seeks to establish equity cannot do so at the expense of creating inequity, no matter how well intentioned. While such a plan may have seemed experimentally sound, its effect on the two groups of students was not. In particular, the students who did not receive computers at home knew very well who they were, and they did not appreciate it. Those students had a larger drop-out rate and poorer attendance than did the students who received computers at home. If this was due to the program, then it describes important effects on and differences between the two groups. But the cost was too high. The evaluators address this issue in the recommendation section to follow.

Second, the "pure" two-group evaluation paradigm was not necessary. There are other congruent research methodologies that can more realistically describe changes in students' skills and attitudes. Here the evaluation team did address the problem by defining the

conception and then the shape of evaluation activities without changing their major intent. Thus, where comparisons of the two groups were judged useful, this was done. For example, results for the two groups are presented for attendance and specific student themes. When pre-post comparisons of the same groups were judged useful, this was done. For example, results are presented for parent-caretaker initial and final impressions. Where data from the entire group were considered to be a useful backdrop, this was presented. For example, information about the entire group as well as the sub-groups is included for students' educational and professional future plans and growth in computer skills.

Studies about the introduction of innovations often describe the Hawthorne Effect. In essence, almost any introduction of something new carries with it a tide of positive results (Kerlinger, 1973). These usually even out and drop off when what has been introduced is no longer new and no longer more interesting or useful than what it replaced. If an innovation is to make a meaningful difference over time it is necessary that its impact be upheld and extended in ever-expanding cycles that themselves make lie of the Hawthorne Effect. Just so with computers. Their introduction may be the easiest activities to contend with, and their expansion in particular ways that help students gain increasing capacity, power, and qualitative insights, the hardest.

Because of the time limit and characteristics of the computer equity program, this evaluation may have described an innovation in the full flush of the Hawthorne Effect. Possibly there was some evening out during the last weeks. What will follow next for the

students involved is vital. Here the flexibility and creativity of program directors and staff will come into play. It is entirely possible that students can learn to use computers in as stereotypical and wasteful ways as some have learned to use books, typewriters, cameras, or their own minds. The challenge that this not happen, the challenge to sustain and increase the positive effect of this computer project, is squarely in the court of the professionals involved.

Research question I:

Does the target population, with access to home use of computers, demonstrate higher performance skills in logic, problem solving, programming, and computer literacy awareness than do participants whose only access to computers is during the day at camp?

Sources that provided data to answer this question are parent-caretaker and student interviews, classroom observations and a computer performance rating instrument.

In interview parent-caretakers gave particularly positive support for this research question. The strongest theme about the growth of skills is theme 12: MY CHILD IS FIGURING THINGS OUT BY HERSELF OR HIMSELF. IN THIS, MY CHILD CAN MAKE TRANSITIONS TO A DIFFERENT COMPUTER, CAN WORK OUT PROBLEMS, AND CAN WORK COOPERATIVELY. This theme and its supporting data presented in the quotations on page 25 make a case for a much higher level of learning than the growth of skills. They attest that the children were developing a style of learning that was essentially self- powered. In this, the children overcame difficulties and mistakes, learned to use other sources when necessary, attacked hard solutions without giving up and, of course, also learned skills. Adults reported that children learned these skills because they wanted to, because they saw the need, rather than because the skills were assigned. If the computers

at home influenced only this sort of learning the project would be considered successful.

Because theme 12 depended on experiences with computers at home, it can be assumed that the group with no computers at home did not have the same opportunities to practice and develop the learning style and the ensuing skills that were described for the other group. Because of this, the learnings that the no-home computer group began in school could not be extended similarly at home.

Other themes that indicate the skill, learning style, and computer literacy that were developed by the computer-at-home group are Theme 15: MY CHILD WORKS DIFFERENTLY. MY CHILD FEELS BETTER ABOUT HIS OR HER WORK, with emphasis on the first sentence, and theme 16: MY CHILD'S LANGUAGE CONTINUES TO CHANGE: MY CHILD USES MORE COMPUTER TERMINOLOGY AND TALKS DIFFERENTLY TO AND ABOUT PEOPLE. About theme 16, it is true that the parents of students who did not receive computers at home were not interviewed and, so , could not describe their children's changes in language. It also seems reasonable that the other group had more opportunities to verbalize their computer literacy at home, with the computer at hand.

The issue of attendance is related to classroom observation findings about growth in skills and literacy. Observations did not distinguish the two groups. That is, students in both groups seemed to be developing their skills similarly, to a larger or smaller degree. However, the attendance rate of the group that received computers at home was appreciably better than that of the other group. Therefore, less is known about the skills and literacy of the group that did not receive computers at home. If the absentees from

this group were many who would have developed weaker skills by the end of the program, and there is some reason to believe that, then there may have been some differences between the groups.

A computer performance rating instrument was completed by the teacher for each student, once in the second week of the program and once at it's end. The instrument has 12 items which can be rated on a seven point scale. (See appendix).

Pre and post ratings for 21 students who received computers at home and for 10 students who did not receive computers made up the data base.

A number of questions were addressed:

1. What were the rated gains in computer skills from pre to post for Group 1 (computers at home) and Group 2 (no computers at home) taken separately and together?

2. How did group 1 and 2 compare in terms of their rated gains in computer skills?

3. What were the gains in computer skills from pre to post for students in the A.M. and P.M. sessions?

4. How did the rated gains in computer skills compare for A.M. and P.M. sessions?

In testing questions 1 through 4 a series of t-tests and analyses of covariance were performed. Relevant means and standard deviations are reported in table 2.

Table 2

Means and Standard Deviations According to Time and Treatment Groups

Time		Group		
A.M.	P.M.	1	2	1 & 2
(n=18)	(n=13)	(n=21)	(n=10)	(n=31)
Pre		Pre		
$\bar{x}$=51.9	37.5	$\bar{x}$=49.5	38.2	45.9
s=18.6	20.0	s=19.8	19.7	20.2
Post		Post		
$\bar{x}$=72.7	52.3	$\bar{x}$=68.3	55.4	64.1
s=14.5	24.9	s=20.1	23.5	21.7

Results indicate that there was significant difference between pre and post scores (p=<.0001) for the entire group and for each group separately. That is, the teacher indicated that all students made significant growth in computer skills.

The difference between rated gains for group 1 with computer at home and group 2 with no computers at home was not significant (p=.546). That is, students from both groups were rated as making similar progress.

The ratings for both A.M. and P.M. groups showed significant gain from pre to post (p=.0001 for both groups). In addition, the difference in gains for A.M. and P.M. groups was also significant (p=.082), suggesting that the A.M. group gained significantly more than the P.M. group in the teacher's eyes.

The results should be viewed in light of some facts already described: (a) because of the poorer attendance of students who did not receive computers, data for the rating analysis were completed for only 10 of them whereas 21 students who received computers were rated. There is a possibility that those students in group 2 who

were not in attendance were also not the strongest students and would have been given lower ratings on the post test. This would have made a wide gap in scores between groups that may have resulted in a significant difference (b) the A.M. students had appreciably better attendance than the P.M. students and were thus known better by the teacher who rated them, and (c) the computers were in homes less time than was expected, from 14 to 21 days. The effects about growth in computer skills reported at home may not yet have carried over to a classroom setting with its own agenda.

Research question II asked:

> **Does the target population, with access to home use of computers, have improved attitudinal concepts relating to self-esteem, improved self-concept, and ability to define career goals and objectives as compared to participants whose only access to computers is during the day at camp?**

Answers to this question came from three sources: students, classroom observations, and parent-caretakers.

For students, the lower attendance of those who did not receive computers at home and the concomitant inability of the research team to have final interviews with many of these students provided a weaker basis for comparison than had been anticipated. Perhaps their attendance was the strongest affective message both groups could send. If this was so, then there was a significant attitudinal difference between the two groups.

While all students contributed to Theme 20: I LEARNED A LOT ABOUT MYSELF. I LEARNED THAT I CAN DO IT, AND THAT OTHERS CAN DO IT. I FEEL GOOD ABOUT MYSELF (p.35), those who received computers at home did so in much greater force. This theme underscores, perhaps better than others, the upbeat feelings of accomplishment, power, and

personal insight. These feelings run through the other student themes also. Even their suggestions to make the camp better, Theme 19 and its sub-themes (pp. 33-34) are characterized by the sort of emotional sturdiness that can take chances, that can speak for the benefit of others as well as for oneself. Classroom observations supported that these students were putting their words into action as they helped each other, planned work, and solved errors.

For parent-caretakers, there is no question but that these people attested to dramatic attitudinal changes. Here also, the picture must be tempered by the fact that only parent-caretakers who were provided computers at home were interviewed. It seems reasonable to assume, however, that while students who did not receive computers at home may have had growth in self-esteem, self-power, they could not show this growth in ways that had something to do with working on the computer at home, teaching others about it, and talking with its presence there. That is a difference. With this in mind, however, the following themes support the contention that the computer-at-home group made considerable attitudinal growth: THEME 15: MY CHILD WORKS DIFFERENTLY. MY CHILD FEELS BETTER ABOUT HIS OR HER WORK (p. 27), THEME 16: MY CHILD'S LANGUAGE CONTINUES TO CHANGE: MY CHILD USES MORE COMPUTER TERMINOLOGY AND TALKS DIFFERENTLY TO AND ABOUT PEOPLE (p. 28), with emphasis on its last phrase, and THEME 10a: MY CHILD HAS CHANGED AS A PERSON (p. 21).

Students were asked to describe their educational and career goals in both beginning and final interviews. Students who received computers at home made final statements that alluded to improved, more specific, goals. This finding was discussed in light of a very small (n=3) comparison group of those who did not receive computers

at home and of other issues around asking children about educational and career goals.

Related Findings

Other findings, not discussed in the answer to research questions and directly related to having a computer at home, describe important impact. Both sub-theme 10c (p. 22) and Theme 13 (p. 25) underscore the intense interest and involvement of family and community members that came about, in the main, because computers were in the homes. Theme 14 (p. 26) describes how children used time differently at home once the computer arrived, and Theme 17 (p. 29) shows that the enthusiastic support of the program and fervent desire that it continue can be seen in great part as a result of having computers at home.

Themes 6, 7, and 8 are ones of "great expectations." They relate more to how these adults and students see the potential of computers in their lives and less to specific parts of the summer program. In a milieu of media promises, perhaps guarantees, that students who work with computers will learn better and more, will succeed, and will have an advantage over others not so fortunate, this finding may not be too surprising. The responsibility, however, to make computer dreams come true is quite another matter.

It seems proper to end this presentation of findings with one that may be of greatest importance to the future of these students. What came through vividly, time and time again, is the utmost belief of parent-caretakers in their children's ability to "make it," a single-mindedness toward taking part actively in helping their children succeed, and a belief that education is the means to that end.

These adults were child advocates in the real sense of the term.

The presence and support of important others is key to human development (Rogers, 1961). Indeed, it may be a critical factor in the difference between those who "beat the odds" of poverty and those who do not (Ely, 1984; Pines, 1979). Personal support together with opportunities such as computer camp make a strong statement.

Recommendations

This vanguard project brought together the support of the private sector, community and national organizations, and the school system to the benefit of children and their families in a low-income community. It holds tremendous promise and equally as much need for professional perspective. The following recommendations are made in the spirit of this promise.

For the 1984 program participants it is recommended that:

1. the program be continued. These children and their families are ready.
2. all students be given computers at home. While the groupings of this summer cannot be changed now, their divisive effects can and should be ameliorated. This action will help.
3. more training sessions for parent-caretakers be made available with opportunities for hands-on experiences, and that these sessions be held at times, such as evenings, that may make them more accessible to adults, and further, that a computer program to be used at home be developed to orient those parent-caretakers who are not able

to attend these sessions.

4. there be at least one session that students may choose to attend about the differences between computers at school and home in which students may review, learn, and practice new commands, routines, and hook-ups.

For present and future programs it is recommended that:

5. the program be expanded to reach more students and their families and that, if there are fees, they be underwritten for people who cannot pay.

6. to aid in program expansion, a Community Outreach Group be established and spearheaded by those 1984 parent-caretakers who were so enthusiastic and willing to help. Some of these people might also serve as "home trainers" of other adults who are not able to attend the scheduled training sessions.

7. the computer curriculum be extended to include programs such as Word Processing and Logo. While the emphasis on programming is commendable, students can also benefit from experiencing computers in another mode, one by which they can learn new skills and apply them as well as continue to develop their higher-level thinking processes.

8. there be one computer per student at school and that working with others be encouraged from such a base when this is useful.

9. if summer programs are continued, the sessions be held in the mornings only. The 1984 A.M. group had better attendance than the P.M. group, more energy, and higher computer skill ratings. Multiple A.M. sessions are suggested, with multiple rooms, computers, and instructors. Each A.M. instructor would be paid a full-time salary for the entire day, which would be spent teaching in the A.M. and

planning individual experiences, communicating with parent-caretakers, and attending training sessions in the P.M.

10. there be training sessions for teaching assistants about ways to interact with students that can enhance learning. Some topics might be (a) when and when not to give help, (b) how to help students find their own answers, (c) how to elicit students' thinking through questions, (d) how to involve students in making choices and decisions, (e) how to create work for individual students, (f) how to help students teach other students. Many of these suggestions were made by the 1984 teaching assistants.

11. the practice of interage grouping be continued. This resulted in much support and cooperation between students and in increased learning for all.

12. the practice of making available exercises to do at home be continued, not as an assignment but as an option for students.

13. each student have his or her own disk. This will facilitate students' independence and access.

14. classroom teachers of the students who were and are participants in the computer camp program be informed of what these students are doing and what they have learned so that they may build on students' skills.

15. the school system provide pertinent information about different makes of computers to parents who wish to purchase them and negotiate group purchase prices that can be available to them.

For future research it is recommended that:

16. a follow-up study of the 1984 summer program participants be carried out and research about future computer programs be instigated. It seems to this evaluator that the school system and related

community organizations have a unique opportunity to explore further in an area where they are certainly on the cutting edge and where there may well be important local state and national implications.

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APPENDIX

NAME OF STUDENT_____

TODAY'S DATE_____

Please rate this student on the following:
(Circle the number)

		low						high
a.	computer knowledge	1	2	3	4	5	6	7
b.	logic	1	2	3	4	5	6	7
c.	problem-solving skills	1	2	3	4	5	6	7
d.	programming skills	1	2	3	4	5	6	7
e.	computer-literacy awareness	1	2	3	4	5	6	7
f.	designs own programs	1	2	3	4	5	6	7
g.	inventiveness (makes new uses or solutions)	1	2	3	4	5	6	7
h.	uses skills learned in other activities (e.g. from one program to another)	1	2	3	4	5	6	7
i.	confidence in computer use	1	2	3	4	5	6	7
j.	seeks help to further computer competence	1	2	3	4	5	6	7
k.	inquisitiveness about computer use	1	2	3	4	5	6	7
l.	cooperates with other students in computer activities	1	2	3	4	5	6	7

Please make any other comments about this student that seem pertinent or that may be of help. If applicable, refer your comments to the particular item(s) above.